

ORDER

DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION

3150.1B

3/7/75

SUBJ: AVIATION PHYSIOLOGY TRAINING FOR FAA FLIGHT PERSONNEL

1. PURPOSE. This order prescribes an aviation physiology training program for FAA flight personnel to include course content, location of agency, military and NASA training facilities, and procedures for applying for such training.
2. DISTRIBUTION. This order is distributed to branch level in Washington, Regions, Aeronautical Center, and NAFEC; and normal distribution to all Flight Standards, Air Traffic, and International Aviation Field Offices.
3. CANCELLATION. Order 3150.1A is canceled.
4. OBJECTIVE. The objective of this order is to provide information, list training sources, define the program content, and provide administrative procedures to enable FAA aircrew personnel to learn the physiological effects of flight and how to compensate for the numerous body handicaps posed by the flight environment.
5. TRAINING REQUIREMENTS. Aviation physiological training requirements are as prescribed in Order 4040.9, General Manual for Operation of FAA Aircraft. Initial qualification in physiological training is met by attendance at a course as outlined in Appendix 2. Recurrent aviation physiological training requirements are listed in Appendix 4.
6. TRAINING PREREQUISITES. Prerequisites for receiving aviation physiological training are:
 - a. A valid first-, second- or third-class medical certificate. An inquiry shall be made concerning the current state of health of each trainee prior to the altitude chamber exposure. Doubtful cases shall be referred to a physician for appropriate decision.
 - b. Assignment to flight duties within FAA as prescribed by Order 4040.9.
 - c. All Air Traffic Control personnel receiving orientation flights on military jet aircraft, which fly at or above 18,000 feet Mean Sea Level, will be required to complete a training course in Aviation Physiology prior to such flights. Controllers flying as passengers in T-39 aircraft and aircraft with a C- designation are exempt from this requirement; however, commanders of these aircraft will brief passengers regarding oxygen system, life support and escape equipment prior to flights.

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7. APPLICATION FOR TRAINING.

- a. The trainee's supervisor should contact the appropriate facility to arrange the initial physiological training course. Care should be exercised to assure the facility understands that the trainees are FAA employees.
- b. Personnel desiring the recurrent program should contact the Special Projects Unit, AAC-952A, FAA Academy, and make arrangements to attend the course in conjunction with their Flight Training Course as outlined in Order 4040.9, paragraph 309. Personnel needing the initial program may also be trained at the FAA Aeronautical Center.
- c. Personnel qualified to receive the recurrent program will normally find it difficult to obtain a suitable schedule for this brief specialized approach at the military facility. If time will not permit attendance at the FAA Aeronautical Center, it is suggested that recurrent applicants accept a 1-day initial program offered more frequently by the military facility.

8. EVIDENCE OF TRAINING. Upon the trainee's successful completion of the course, the Physiological Training Facility (Appendix 1) shall (1) Issue FAA Form 3150-1, Physiological Training card, to the individual, and (2) send AC Form 9100-12, Physiological Training, to the Civil Aeromedical Institute's Physiological Operations and Training Section, AAC-143. Upon receipt of AC Form 9100-12, AAC-143 shall complete AC Form 3150-4, Individual Physiological Training Record, for inclusion in the individual's personnel records. Students trained at the Aeronautical Center shall be issued FAA Form 3150-1 by AAC-143

9. COURSE CONTENT. See Appendix 2.

10. FORMS. AC Forms 3150-4 and 9100-12, unit of issue: SH, are stocked by AAC-143. FAA Form 3150-1, unit of issue: EA, is stocked by the FAA Depot, FSN: 0052-00-678-8000.



H. L. REIGHARD, M.D.
Federal Air Surgeon

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Appendix 1

APPENDIX 1. U. S. GOVERNMENT PHYSIOLOGICAL TRAINING FACILITIES

Aeronautical Center, Oklahoma City, Okla.

Andrews AFB, Md.

Barbers Point NAS, Hawaii

Carswell AFB, Tex.

Castle AFB, Calif.

Cherry Point MCAS, N.C.

Columbia AFB, Miss.

Corpus Christi NAS, Tex.

Craig AFB, Ala.

Davis-Monthan AFB, Ariz.

Edwards AFB, Calif.

Ellsworth AFB, S.Dak.

Fairchild AFB, Wash.

George AFB, Calif.

Jacksonville NAS, Fla.

Langley AFB, Va.

Lemoore NAS, Calif.

Laughlin AFB, Tex.

Little Rock AFB, Ark.

Lowry AFB, Colo.

MacDill AFB, Fla.

Mather AFB, Calif.

Moody AFB, Ga.

NASA-Johnson Space Center, Tex.

Norfolk NAS, Va.

Offutt AFB, Nebr.

Patuxent River NAS, Md.

Pease AFB, N.H.

Pensacola NAS, Fla.

Point Mugu NMC, Calif.

Randolph AFB, Tex.

Reese AFB, Tex.

San Diego NAS, Calif.

Shaw AFB, S.C.

Tyndall AFB, Fla.

Webb AFB, Tex.

Whidbey Island NAS, Wash.

Williams AFB, Ariz.

Wright-Patterson AFB, Ohio

APPENDIX 2. TOPIC OUTLINE FOR ACADEMIC TRAINING

This topic outline is a guide only. It is expected that the type of group will determine whether the instructor chooses to cover the subject material in a different sequence. It might also be appropriate to change the curriculum subjects on occasion. The idea is to teach a "need to know" program in this short time period.

1. Physics of the Atmosphere
 - A. Composition
 - B. Divisions
 - C. Atmospheric Pressure
 - D. Gas Laws
2. Trapped Gases
 - A. Anatomical Areas Affected
 - B. Correlation of Gas Law Physics
 - C. Disease State
 - D. Treatment
3. Hypoxia
 - A. Definition - Types - Causes
 - B. Correlation of Atmospheric Physics
 - C. Respiratory and Circulation
 Physiology Correlation with Hypoxia
 - D. Symptoms - Time of Effective Performance
 - E. Self-imposed Stresses - Enhancement of
 Low Grade Hypoxia
 - F. Use of Oxygen as Hypoxia Combatant - Low
 and High Altitudes
 - G. Oxygen Use for Improved Night Vision
4. Oxygen Equipment Use and Equipment Familiarization
 - A. Description of Systems and Equipment Used in
 Civil Aviation with Primary Emphasis on High
 Pressure, Continuous Flow and Portable Kits.
 Use slides contained in oxygen equipment slide
 set.
5. Hyperventilation
 - A. Definition - Cause - Physiology
 - B. Symptoms - Treatment

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APPENDIX 2. TOPIC OUTLINE FOR ACADEMIC TRAINING (Continued)

6. Evolved Gas Disorder

- A. Definition - Physiology
- B. Treatment
- C. Correlation with SCUBA

7. Disorientation

- A. Physiology of Visual and Vestibular Illusions
- B. Correlation with both VFR and IFR Flight
- C. Prevention and Cure
- D. Barany Chair Demonstrations

8. Decompression Phenomena

- A. How It Occurs - Physics
- B. Emergency Procedures

9. Pre-flight Briefing

- A. Oxygen Equipment
- B. Mask Fitting and Chamber Assemblage

10. Altitude Simulator Program

See Appendix 3 for altitude simulator profile and rapid decompression flight procedures.

APPENDIX 3.Altitude Simulator Flight Profile
USAF/FAA Agreement TraineesTime: Approx. 50 min.
(16 Students)PROCEDURE

PHASE I - OXYGEN EQUIPMENT FAMILIARIZATION AND HYPOXIA SYMPTOMS

Orientation of oxygen equipment, intercom and instrumentation configurations. Pre-flight check. Oxygen pre-breathing is optional. Begin ear check ascent. Students should be breathing 100% oxygen. Do not exceed 1,500 FPM on ear check descent. Following the ear check, trainees will begin ascent to 25,000 feet. Average rate of ascent should not exceed 3,500 FPM. During ascent, discuss gas expansion and elaborate further on the elimination of oxygen mask leakage, periodic checks of oxygen regulator operation and connections, etc. Divide trainees into two groups for the hypoxia exercise. Level at 25,000 feet. Perform the hypoxia exercises on each group allowing the trainees to experience the full onset of hypoxia, but try to prevent any student from progressing to the point of unconsciousness. Employ devices to challenge the mental and physical dexterity processes. Upon completion of the hypoxia exercises, begin chamber descent. Average rate of descent should not exceed 3,000 FPM. Discuss the individual tolerance factors, symptom variances, performance inabilities, time versus altitude in relation to severity, etc. Encourage students to participate in enumeration of hypoxia symptoms. Descend to ground level.

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APPENDIX 3 (Continued)

PHASE II - RAPID DECOMPRESSION

Ascend chamber compartment to the predetermined altitude at which, when lock compartment is decompressed, the students will not level below 20,000 feet or higher than 25,000 feet. The rate of ascent should be controlled to prevent the students from ascending to level-off altitude faster than that performed on the Air Force Decompression Profile. Students should have their oxygen equipment in the standby position. Lock compartment should be ascended to 8,000 feet and the decompression performed without an obvious pre-signal to the students. The students will be expected to recognize the onset of the decompression and don their oxygen masks and check their oxygen equipment. Assistance will be given if necessary. During descent, discuss importance of pre-flight check, recognition of physical phenomena associated with decompression--rate of ascent versus cabin volume--possibility of excitement and hyperventilation, cure for hyperventilation.

Rate of descent should not exceed an average of 3,000 FPM. Personnel should experience pressure breathing by activating the emergency lever or pressure control knob as soon as possible after starting descent. After finishing the pressure breathing exercise, students should place the diluter control lever in the "normal oxygen" position.

Question all chamber participants regarding any physical discomforts. Make a negative remark on their sign-in cards or flight sheet. If affirmative, make a remark concerning their post-chamber treatment and condition when permitted to leave.

APPENDIX 4.

Physiological Training Course
Recurrent Training

TOPIC OUTLINE

This course given at Aeronautical Center.

Duration: 4 hours

1. Content - Classroom - 3 hours
 - A. Hypoxia
 - B. Self-imposed Stress
 - C. Decompression
 - D. Oxygen Systems and Equipment
 - E. Decompression Sickness
2. Altitude Simulator Flight: 1 hour
 - A. Pre-flight Equipment
 - B. Ear Clearance Pretest
Descent from 10,000 feet to 2,000 feet at 1,500 FPM
 - C. Rapid Decompression
Ascent from 8,000 feet to 18,000 feet in 10 seconds
 - D. Hypoxia
Mask removed at 25,000 feet
 - E. Pressure Breathing
Trainees experience a mild pressure breathing effect
at 25,000 feet.
 - F. Descent to ground level.

